

# HMC183QS24

## GaAs MMIC SP8T NON-REFLECTIVE SWITCH, DC - 2.0 GHz

### Typical Applications

The HMC183QS24 is ideal for:

- Basestation Infrastructure

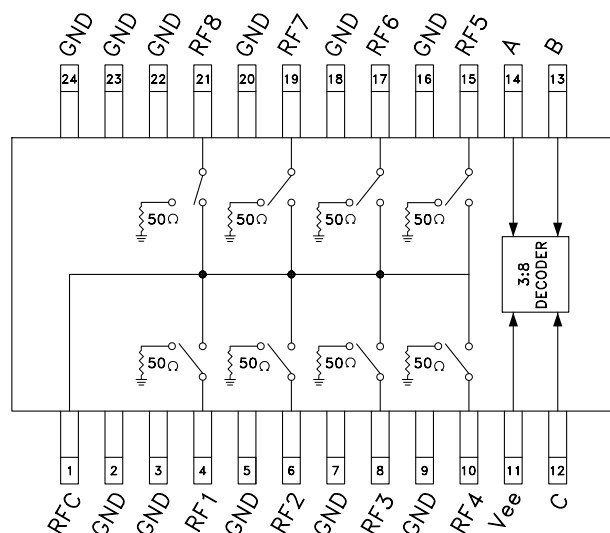
### Features

Low Insertion Loss (1 GHz): 0.8dB

Integrated 3:8 Decoder

24 Lead QSOP Package

### Functional Diagram



### General Description

The HMC183QS24 is a low-cost non-reflective SP8T switch in a 24-lead QSOP package for use in antenna diversity, switched filter banks, gain/attenuation selection, and general channel multiplexing applications. A 3:8 decoder is integrated on the switch, requiring only 3 control lines with a negative bias to select an RF path. The 3:8 decoder replaces 16 control lines normally required by GaAs SP8T switches. Switch outputs are terminated when "off". The QSOP24 package occupies the same area as a 14-lead SOIC. See positive bias/TTL version HMC253QS24.

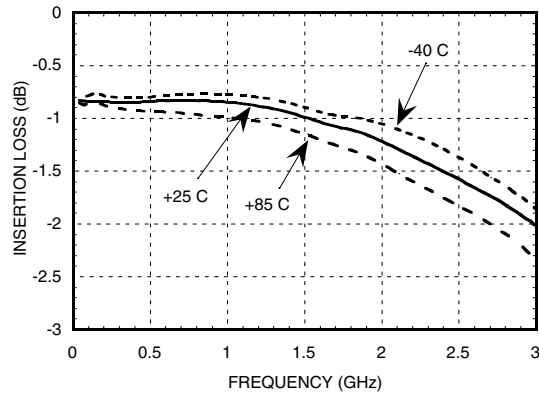
### Electrical Specifications,

$T_A = +25^\circ\text{C}$ , For 0/-5V Control and Vee = -5V in a 50 Ohm System

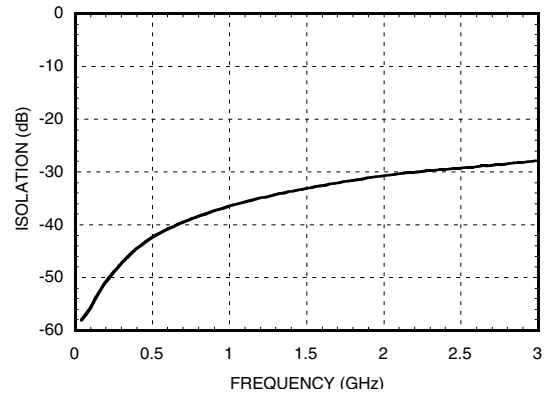
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 1.0 GHz		0.8	1.2	dB
	DC - 1.5 GHz		1.0	1.5	dB
	DC - 2.0 GHz		1.3	1.8	dB
Isolation	DC - 0.5 GHz	38	42		dB
	DC - 1.0 GHz	32	36		dB
	DC - 1.5 GHz	29	33		dB
	DC - 2.0 GHz	26	30		dB
Return Loss	DC - 1.0 GHz	16	20		dB
	DC - 1.5 GHz	10	14		dB
	DC - 2.0 GHz	7	11		dB
Return Loss	DC - 1.0 GHz	12	15		dB
	DC - 1.5 GHz	10	13		dB
	DC - 2.0 GHz	10	13		dB
Input Power for 1 dB Compression	50 MHz		18		dBm
	0.5 - 2.0 GHz		20		dBm
Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone)	50 MHz	30	35		dBm
	0.5 - 2.0 GHz	37	42		dBm
Switching Characteristics	DC - 2.0 GHz	tRISE, tFALL (10/90% RF)	35		ns
		tON, tOFF (50% CTL to 10/90% RF)	50		ns

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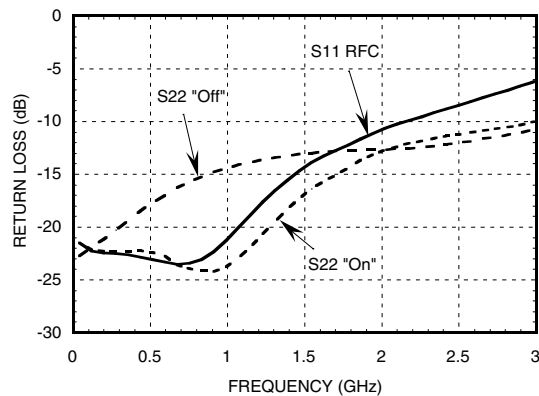
**Insertion Loss**



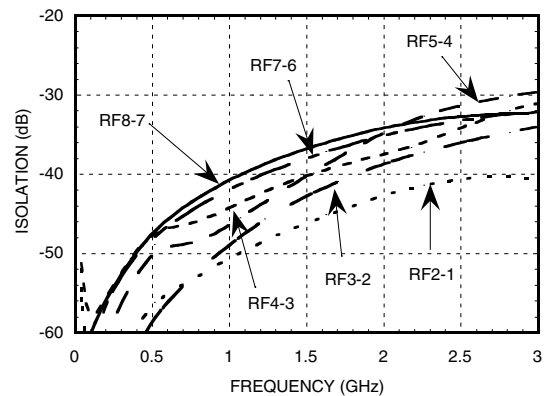
**Isolation**



**Return Loss**



**Isolation Between Several RF I/Os**



**Bias Voltage & Current**

Vee Range = -5.0 Vdc $\pm$ 10%		
Vee (Vdc)	Iee (Typ.) (mA)	Iee (Max.) (mA)
-5.0	6.0	9.0

**Control Voltages**

State	Bias Condition
Low	0 to -3 VDC 2 70 $\mu$ A Typ.
High	-5 to -4.2 VDC @ 5 $\mu$ A Typ.

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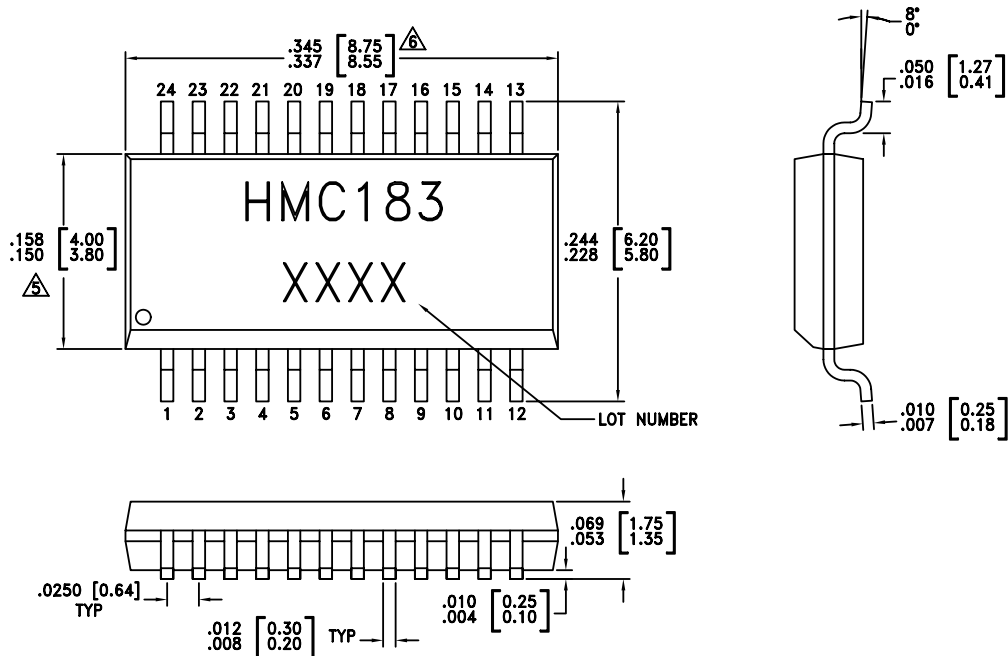
### Absolute Maximum Ratings

Bias Voltage Range (Port Vee)	-7.0 Vdc
Control Voltage Range (A & B)	Vee -0.5 to +1.0 Vdc
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
Maximum Input Power	+26 dBm (<500 MHz) +29 dBm (>500 MHz)

### Truth Table

Control Input			Signal Path State
A	B	C	RFCOM to:
High	High	High	RF1
Low	High	High	RF2
High	Low	High	RF3
Low	Low	High	RF4
High	High	Low	RF5
Low	High	Low	RF6
High	Low	Low	RF7
Low	Low	Low	RF8

### Outline Drawing

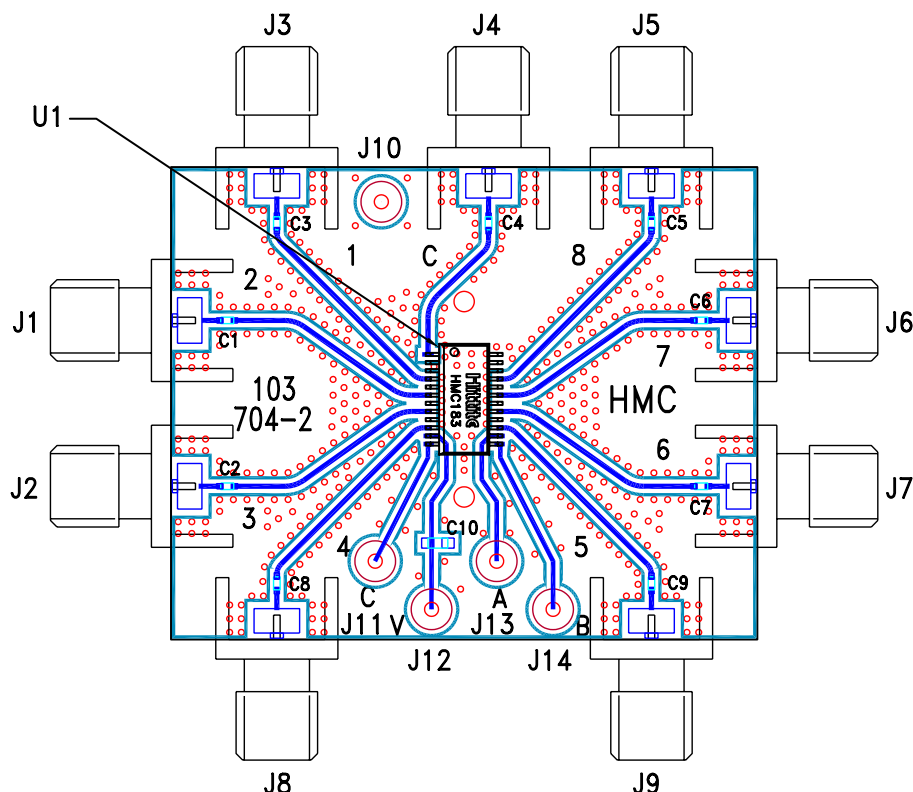


#### NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

## GaAs MMIC SP8T NON-REFLECTIVE SWITCH, DC - 2.0 GHz

### Evaluation Circuit Board



### List of Material

Item	Description
J1 - J9	PC Mount SMA RF Connector
J10 - J14	DC Pin
C1 - C9	100 pF capacitor, 0402 Pkg.
C10	10,000 pF capacitor, 0603 Pkg.
U1	HMC183QS24 SP8T Switch
PCB*	103704 Evaluation PCB
* Circuit Board Material: Rogers 4350	

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads and package bottom should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.